

Burke, Joseph
while, the great coal port of
new Mexico? 1805?

THE COAL FIELDS OF ALABAMA.

J. W. BURKE.

THE WARRIOR BASIN.

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In a few years we will be obliged to deal with the problem of supplying the Gulf of Mexico, the West Indies, the Isthmus of Panama, the countries of South and Central America on the Atlantic and Pacific—and the entire Pacific coast—with cheap coal. This trade, already gigantic in its proportions, is now almost entirely absorbed by Great Britain, mainly for the reason that it is delivered at a less price than coal at present mined in the United States, and the control of this enormous trade has remained for years in British hands, unchallenged. The products of the American mines are almost entirely devoted to home consumption. The great increase of domestic manufactures, of railroads, steam vessels, and the manufacture of iron, has steadily kept pace with the production of bituminous coal in the United States, and the home demand constantly increasing, will for years to come be fully equal to the capacity of the mines.

This is, perhaps, one reason why the export trade in coal is so much restricted.

There is, however, an additional one, and that is, that the expense of mining coal and delivering it at American tide-water will not justify its extensive exportation in competition with England.

The long line of water transportation to New Orleans—constantly beset with physical difficulties, and the expensive transportation by rail and otherwise to the Atlantic sea-board are not favorable to a large or profitable exportation.

To find a portion of our country where these geographical obstacles, distance and locality, cease to be impediments to the development of this trade with the countries named, is what is now much to be desired, in view of the construction of the Panama

and Eads' ship-railway, and the immense influence that those channels of commerce must necessarily exert on our country.

The object of the present treatise is to present facts showing that the object desired is easily attainable.

It is only of late years that the existence of coal in Alabama has been brought into general public notice. It is a marvel to practical men how, for years, Pennsylvania sent her coal 2000 miles to the Gulf, and England carried it over 5000 miles of ocean to supply our Gulf and Atlantic sea-coast cities and towns, whilst within 250 miles of the tide, right within the heart of our own domains, there existed nearly 6000 square miles of coal equal in all points of excellence to that of the Northern bituminous fields, and superior in many respects to the British article.

Even to-day there are some who discredit the statements of those who have published their observations of this magnificent deposit. Slowly but surely the vast mineral treasures of Alabama are becoming utilized; the cheap production of iron rendered possible by the cheap production of coal has led the way to the foundation of an industry whose progress in eight years has been simply marvelous.

The existence of the coal fields of Alabama was noticed as far back as 1834. A writer in Silliman's Journal, vol. xxxi, in describing them, says: "This State is very rich in bituminous coal of a most excellent quality. It is in every respect equal if not superior to the very best English coal. It is very heavy, burns with a good flame, and gives out much heat. It also yields the carbureted hydrogen gas in immense quantity. The veins or formation of this coal are quite extensive. It is first seen in the bed of the Black Warrior river, near Tuscaloosa, and next appears on the surface of the ground to the northeast and east of the town."

In 1846 Sir Charles Lyell visited Alabama and made analysis of the coal of the Warrior field, of which he said: "The most western of the two coal fields has been found by Prof. Brumby to be no less than ninety miles long from northeast to southwest, with a breadth of from ten to thirty miles, extending through the counties of Tuscaloosa, Walker, Jefferson and Blount, on both sides of the Warrior river and its branches. The most eastern coal field, or that of the Cahawba, is nearly of equal length and width."

Notwithstanding the contiguity of this enormous body of coal

to the Gulf of Mexico little effort has ever been made to clear away the obstacles that prevented its cheap transportation to the tide. As far back as 1850 coal was mined in the bed of the Warrior and along the banks of the numerous streams tributary to it above Tuscaloosa, and floated to Mobile during the winter freshets of the river, where it was used for fuel and gas purposes with the most satisfactory results. Between the coal fields and continuously navigable water exist obstructions caused by the coal measures themselves, rocky shoals with intervals and long reaches of smooth deep water.

Before the introduction of railroads the people of that part of the country constructed rude flatboats, quarried the coal out of the dried beds of the creeks in summer, after the "laying by" of their crops, and loading those frail crafts awaited the rise in the Warrior to get over the shoals. With the exception of this very primitive mode of operation there was but little coal mined in the Warrior field, and that was confined to the farmers living on the river, who carried it to Mobile not as a regular business but as a mere incident to a venture rendered necessary in getting their cotton crops to market. The construction of the South and North Railroad and of the Alabama and Chattanooga Railroad on the eastern and southern boundaries of the Warrior field, the discovery that the coal mined on those lines could be used in the manufacture of pig iron and was pronounced excellent for steam purposes, attracted the attention of capitalists, and in a few years the iron and coal industries on these great lines of railroads increased with astonishing rapidity. Mining towns grew up at once, bringing a large increase of capital and population to the State, and the city of Birmingham sprang into existence and became in a decade an extensive manufacturing centre. In the space of ten years the whole face of the country was changed by the construction of one line of railroad. In no part of the country have the coal and iron industries attained such proportions in so short a space of time.

THE WARRIOR COAL FIELD.

This magnificent deposit of coal takes its name from the Warrior river, which finding its source in the mountainous country bordering the coal measures of the State of Alabama on the north, runs

directly through them, flowing into the Tombigbee river at Demopolis, Ala., and thence onward into the Alabama river and the Gulf of Mexico at Mobile. For convenience it has been divided into "The Plateau or Table-Land region" and "The Warrior Basin," the plateaus sinking into the basin proper.

"There are three troughs or synclinal basins in the Warrior coal field, with local wrinkles, each one resembling in form a long, shallow tray, with seams dipping at the edges and ends, but nearly horizontal in the centre. The first extends from near Birmingham, going westwardly, to a point near the Warrior river, in the great Sequatchie fold, which extends from Tennessee, southwesterly, in a straight line with Sequatchie Valley, in that State, and its continuation, Brown's Valley, in Alabama, crossing the Black Warrior river, at a point near the mouth of Five-Mile creek. The second extends from this Sequatchie fold, or its continuation, to Byler's ridge, which forms the shed between the waters of the Black Warrior and West Sipsey, a tributary of the Tombigbee. The third extends from Byler's ridge to the western edge of the coal field, and is the smallest and least important of the three coal basins mentioned."—Killebrew.

In the first two basins, which may be designated respectively the Birmingham Basin and the Jasper Basin, there are not less, according to Prof. Smith, State Geologist of Alabama, than twenty-six hundred feet of coal measures, including between thirty and thirty-five seams of coal, five of which have been extensively mined.

Mr. W. A. Gould, an intelligent miner, who has been prospecting in this coal field for twenty-seven years, and whose knowledge of it is extensive and accurate, he having opened many of the coal mines which are now in successful operation, asserts that he has exposed forty-two different seams of coal in the Warrior coal field, and he knows the coal measures there to be over four thousand feet in thickness. This is a remarkable statement; and shows an extraordinary development of the coal measures of the Alabama coal fields as compared with others of the United States. In Pennsylvania, according to Prof. Rogers, the thickness of the coal measures is two thousand and eighty-nine feet. In Ohio, according to Prof. Newberry, there are fourteen hundred and fifty-five feet. In West Virginia, a thousand and twenty-nine feet; while in Indiana, Prof. Cox makes them six hundred and fifty-nine, while Prof. Worthen, State Geologist of Illinois, makes their thickness - or that State about six hundred feet. The Missouri basin is but

little thicker. So, taking the lowest estimate, that of Prof. Smith, it appears that the coal measures of the Warrior basin have a greater thickness than those of any other field in the United States by over five hundred feet, and according to Mr. Gould, of fifteen hundred feet. A section furnished by the latter gentleman, the result of three years' work in the southern end of the Warrior coal field, shows the following seams of coal, beginning at the upper one:

1. Snyder Seam	1 foot 6 inches.
2. Hayes Seam	3 " 0 "
3. Johnson Seam.	2 " 0 "
4. Cowlen Seam.	2 " 6 "
5. Clements Seam.	2 " 6 "
6. Coal Seam.	1 " 5 "
7. Coal.	1 " 2 "
8. Selum Seam	2 " 0 "
9. Gould Seam	3 " 0 "
10. Coal.	1 " 8 "
11. Blacker Seam.	3 " 0 "
12. Coal	2 " 3 "
13. Swamp Seam	4 " 4 "
14. Hard Vein (with Shale partings).	5 " 8 "
15. Cleveland Seam.	3 " 4 "
16. Coal.	4 " 0 "
17. Coal (block).	3 " 0 "
18. Triple Seam	2 " 1 "
19. Coal.	1 " 5 "
20. Coal.	1 " 10 "
21. Coal.	1 " 8 "
22. Coal.	2 " 0 "
23. Coal.	2 " 2 "
24. Coal.	2 " 2 "
25. Halman Seam (Shale parting)	6 " 8 "
26. Coal.	6 " 8 "
27. Coal (White Ash).	3 " 1 "
28. Coal.	4 " 0 "
29. Coal.	5 " 6 "
30. Coal.	8 " 6 "
31. Coal.	4 " 0 "
32. Coal.	3 " 3 "

The Louisville and Nashville Railroad runs through the eastern edge of the field, the Alabama Great Southern skirting it on the south.

The Georgia Pacific crosses it, entering it seven miles west of Birmingham, in Jefferson county, and thence through that county westwardly through Walker and Fayette counties to Columbus, Miss., where it connects with the Mobile and Ohio.

This road is built and operated between Atlanta, Ga., and the Milner coal mines, ten miles west of Birmingham, and from Columbus, Miss., to the western edge of Walker county, leaving an intermediate gap through the very heart of the coal measures of about forty miles, which is now being constructed. The Birmingham and Tennessee Railroad, now building, enters it on the northern boundary and penetrates it centrally, connecting with the Georgia Pacific at a point in Walker county.

At the present date all coal mined in Alabama is transported by rail, the internal local demand taking the entire product, and the mines being exclusively located in the plateau region spoken of.

The principal markets for coal are New Orleans, Mobile, Galveston, Montgomery, Selma, and the towns and cities in Alabama, Mississippi and Georgia. A very considerable part is converted into coke and sold to the iron furnaces in Georgia and Alabama, and a large portion is disposed of as steam coal in New Orleans, Pensacola and Mobile, in those cities entirely superseding foreign coal, and successfully competing with Pennsylvania and Ohio coals. The coal industry in Alabama is in its infancy, but its growth has been almost phenomenal. In 1869 there were produced but 11,000 tons, whilst in 1883 the estimated output of the mines was 1,000,000 tons, and still the product does not keep pace with the demand. The cost of mining a ton of coal in the Warrior field and delivering it on the cars does not exceed \$1.00. The rate of transportation to Mobile is \$2.00, to New Orleans \$2.20. It is sold readily in those cities at \$3.75 per ton for steam purposes, leaving the moderate margin of 75c. per ton for handling and profit to the mine owner and the dealer. In this estimate it will be seen that fifty per cent. of the cost of delivery at tide water is that of transportation, and any means tending to reduce this item is of the greatest importance, not alone to this great and increasing industry but to the commerce of the whole world in the Gulf, West Indies and South Atlantic.

The productive area of the coal fields of Alabama is estimated at 5,350 square miles. Of this the Coosa field has 150, the Cahawba 200, and the Warrior 5,000 square miles. These divisions take their names from the respective rivers—Warrior, Cahaba and Coosa, which flow through them. From these streams branch out in all directions innumerable creeks, subdividing the coal measures, and affording, especially in the case of the Warrior, many miles of deep water nine months in the year, thus enabling the coal to be mined far up in the interior and floated to the main stream. Human skill could not have devised a more perfect system of internal canals or auxiliary water courses than nature has provided on the Warrior. Branching off in all directions those creeks cut their way through the measures, and in many cases flow over solid beds of coal. During the summer months this river is not navigable above Tuscaloosa. In fact, it is almost at the very verge of the coal measures in Tuscaloosa that the obstructions to navigation commence, caused by the structure of the coal measures themselves. “At this point the river changes its entire character, forming during low water a series of lakes and falls over rocky ledges which completely impede navigation.” In very high stages of the Warrior, and before the construction of railroads, flatboats were successfully carried to Mobile, but the dangerous passage over the shoals and the losses incurred, caused the ultimate abandonment of that means of transportation, and at the present time the agricultural produce of the Warrior country is carried from thirty to forty-five miles to the Louisville and Nashville Railroad at Birmingham, and the business of conveying coal by river entirely suspended.

The great apparent fact connected with these Alabama coal fields is that, taking into consideration their geographical position, their physical characteristics, the superior quality of their product, and the cheapness with which they may be mined and transported, they constitute the only source of supply in the entire world which can successfully compete with British coal in the Gulf, West Indies, South America, and on the completion of the Panama canal, on the entire Pacific coast. When the facts on which this assertion is founded are stated, the reality is startling. The coal area of Great Britain is estimated at 11,900 square miles, and that of the United States 192,000 square miles. Thus it is seen that the area

of the Warrior coal field alone is nearly equal to half that of Great Britain.

In 1880 Great Britain mined 133,808,000 tons of mineral coal, and the United States 59,808,398 tons.

In 1881 Great Britain exported 18,760,000 tons of coal, to the amount of \$40,265,000; and the United States, in the fiscal year ending June 30, 1881, only 653,246 tons, in value \$2,831,463.

The immense bulk of British exported coal is bituminous and much the larger part of the American exportation is anthracite. During the year 1881 the exportation of bituminous coal by the United States amounted to the contemptible exhibit of 191,038 tons, in value \$739,532, and of this the West Indies, Mexico, Central and South America received only 78,672 tons, of the value of \$328,726.

In order to show how completely this trade is controlled by Great Britain the following statement taken from the statistics of the respective countries, and from the reports of our Consuls in those countries to the State Department is appended. The exportation to these countries is particularly referred to, because they will constitute the nearest and most inevitable market for our Gulf coal in the future:

BITUMINOUS COAL IMPORTED INTO	1881.	1881.
	From U. States.	From G. Britain.
United States of Columbia.....	\$ 23,564	\$ 39,000
Mexico.....	7,326	156,000
British Guiana.....		225,000
Brazil.....	1,024	948 000
Uruguay.....		350,000
Argentine Republic.....		551,193
Chili.....		437,000
Bolivia.....		30,000
Peru.....		117,000
British West India.....	1,804	307,000
French West Indies.....	2,400	185,000
Danish West Indies.....	20,038	127,000
Spanish West Indies.....	267,541	389,000
Total.....	\$323,693	\$3,761,193

The amount of American anthracite coal exported to the same countries during the same period amounted to \$168,306, but as the exportation of British coal to those countries was mainly bituminous coal, a fairer comparison is made by referring to that kind of coal in treating of American exportation. When we compare the total output of the British mines with those of our own and then the ratio of our exportation with that of Great Britain, the facts are not flattering to us, but when we are confronted with the statement of

the National Bureau of Statistics, that in the year ending June 30, 1881, the importation of British bituminous coal *into the United States*—having to pay a duty of seventy-five cents per ton—was \$2,008,974, and the exportation of American bituminous coal to *all countries* was only \$739,532, it is a subject of concern to all friends of American trade. The wooden sailing ship is fast disappearing from the seas. In twenty-five years the great bulk of the ocean-carrying trade will be done by large, commodious freight steamships. The completion of the Panama canal, Eads' ship-railway across Tehuantepec, and the possibility of the construction of the Florida ship canal, will make this matter of coal supply a subject for the consideration of the entire people of the United States. The Gulf of Mexico ought by right to be an American lake, but if we have to depend on foreign countries for the supply of cheap steam coal we never can maintain our position as a great maritime and commercial nation in those waters.

The proposition is self evident on the palpable facts now existing that unless a cheaper source of supply is had in this country, so as to render us entirely independent of both Great Britain and Australia on the Atlantic and Pacific, we shall see England maintaining the control of the Isthmus of Panama as absolutely as she now does that of Suez.

CHEAP COAL ON THE GULF.

There can be no longer any doubt as to the cost of coal delivered at Mobile by barges from the Warrior. *It is solely a question of transportation.* Steam coal (run of mine) is mined in Alabama and delivered on the railroad at \$1.25 a ton at the highest, paying the mine owner a good profit. The rate of transportation to Mobile, \$2.00 per ton, practically prohibits exportation, since steam coal is delivered free on board ship in England at \$2.50 per ton, and until cheap water transportation is provided, American coal cannot be exported from any Gulf port.

A most excellent authority on this subject is Col. Horace Harding, the Assistant United States Engineer of the Warrior River Improvement. In a carefully considered paper, in which the cost of mining coal on the Warrior and transporting it in barges to the Gulf is fully and ably treated, he sums up the following result:

Mining	.53c. per ton.
Handling.....	.10 “
Transportation by river to Mobile.....	.26 “
Unloading and storing..	.25 “
General management.....	.12 “
Profit.....	.50 “

\$1.76 per ton.

“That the above estimate of cost by river transportation is approximately correct, is indicated by the fact that coal from the Kanawha, Alleghany, and other streams, is sold at Cincinnati in barge for \$1.75 per ton. Allowing the usual margin of 50c. per ton for profit, the cost would be \$1.25, which, leaving out the item for unloading, is about the same as figured out above.”

The great advantage possessed by the coals in the Warrior basin is the ease with which they may be mined. Practically they may be in many places shoveled from the river bank into the coal barges, the inclination of the seams rarely exceeding 3°.

This extraordinary condition of things must necessarily reduce materially the foregoing estimate of cost, and it may be assumed that coal may be mined from the seams on the river, loaded in barges and delivered at tide water in the Gulf at \$1.50 per ton.

In 1850 Prof. Tuomy, the State Geologist, wrote of the coal in the Warrior basin: “For some years to come a considerable quantity of coal will be procured in the beds of the streams or where it is but loosely covered by loose, superficial beds, and, in either case, without the investment of much capital. The slight inclination of the beds and the physical features of the country will always tend to lessen the expense of mining operations on the Warrior.”—(Geological Report, 1850.) During a casual examination of the Warrior basin, made in the summer of 1883, the writer was amazed at the enormous developments of coal. It could be seen in the beds of the rivers and creeks, seam over seam, on the steep banks of the Warrior, in many places eight feet in thickness and rarely under twenty-eight inches. Truly they are entitled to the appellation of coal fields, for in many places the superficial covering consists of a few feet of clay and shale and the coal may be literally dug from the earth.

Regarding the character of the seams on the Mulberry Branch of the Warrior, Prof. Tuomy says: “A very remarkable change

takes place in the character of the coal on this branch of the Warrior. It becomes very much cleaner and harder. Although it breaks into small pieces it rarely produces much slack, and as it comes from the bed it resembles screened coal. This of all the coal in the State will best bear transportation on account of its superior hardness."

He then proceeds to give the measurements of twenty outcrops of different seams, measuring in thickness of seams from three to eight feet. Of one of these seams he says:

"On Lost creek some fine exposures occur near the point where the Jasper road crosses it. They are only seen, however, in the bed of the creek. A section of the principal bed is as follows:

Coal.....	10 inches.
Slate	14 "
Coal.....	48 "

"There are at least four other beds super-imposed on this, which appear higher up the stream. One is remarkable for having a seam of cannel coal on the top of the common coal. The depth of the water prevented me making an examination of this valuable bed, but it is interesting to know that cannel coal exists in the State, and I have no doubt that future explorations will bring thicker seams to our knowledge."

"These sections will give a fairer view of the Warrior coal field than a whole chapter of description. They are, however, limited to a small portion of the entire area, but it is a part that must always command attention on account of its vicinity to the river.

"Notwithstanding the definite character and value of the information presented here, no one feels more sensibly than I do how very inadequately it represents this magnificent formation."*—Geological Report, 1850.

Thus wrote this accomplished geologist and scientific scholar thirty-three years ago. His luminous mind grasped the idea of controlling with these splendid coal fields the supply of coal to the Gulf and South American countries, and he was the first to give accurate information with a view of advancing this great commercial enterprise.

The extraordinary developments of coal along the banks of the Warrior from the mouth of Lost creek to Black Water creek for a distance of over twenty-five miles, are almost incredible.

* NOTE.—This magnificent property from which coal was largely mined in 1855 and up to 1860, is situated on the western bank of the Warrior, and is now owned by the Gulf Coal and Coke Company of Mobile.

It is in this section so highly spoken of by Prof. Tuomy, that the seams are thickest and the coal freest from slate. Thus on the western side of the river, about the mouth of Lost creek (itself navigable for a considerable distance), three seams of coal outcrop in the bank. Two of those are above the reach of high water and the third or lowest at the water level. The top seam was extensively mined up to 1860, when the war put a stop to the business. This is known as the Van Hoose mine. The seam is forty-two inches thick, has an inclination upwards of 3° , is self-draining, and the coal cars were propelled by their own weight from the interior of the mine to the coal chute on the bank and the coal delivered to the barges. This coal was largely used by the Mobile Gas Company, and pronounced superior to any coal used for that purpose in the city.

About forty feet below the floor of this mine another seam outcrops in the steep banks of the Warrior. It is thirty-eight inches thick, with a four-inch stratum of black slate almost central in the seam.

The lowest seam appears above low water on the river. It is said to be six feet in thickness, and was raised in the river in low stages of water and boated to Mobile in former days.

Ascending Lost creek to the crossing of the Georgia Pacific the coal is found in the bed of that stream in the banks on both sides and on the small streams running into it. Notably among the last are Falls creek, Wolf creek, Fanny's branch and Cane creek, now celebrated for the splendid character of the coals found in such great abundance along these water courses. Higher up the river, on the very bank, are the celebrated Mount Carmel seams, which are thus described by J. B. Killebrew.

"On the western side of Black Warrior, a small stream called Frog-Ague comes in from the west and enters the river near Mount Carmel. On the banks of this stream a magnificent seam of coal six feet in thickness crops out for thirty or forty feet, until it is concealed by the debris which has fallen from the overhanging banks. The coal from this seam is very hard and pure, having a large amount of mineral charcoal in its composition, which is an infallible sign of coal high in carbon. Coal was mined and shipped from this place for many years.

"Below this seam, some twenty or thirty feet, another seam three feet in thickness occurs, and forty feet below this a third seam, five feet thick, occurs in the banks of Cane creek, and below

this again a fourth seam is reported which is said to be ten feet thick, though owing to the muddiness and depth of the water I was not enabled to examine it. Its existence is vouched for by highly credible witnesses. So it appears that in this locality four large seams of coal, measuring in the aggregate over twenty feet, occur, and the quality is equal in every respect to the best coal which I saw from the best mines in Alabama. It is very hard, comparatively free from sulphur, breaking with a smooth fracture, and capable of being transported to any distance. It resembles the Pratt coal in having straight parallel sides, in its irregular lamination, in its semi-lustrous appearance, and in having irregular spots of shiny bituminous matter appearing on a lustreless surface."

The seams of coal contiguous to water transportation which are likely to be mined on the improvement of the river, are alone referred to here, as it is quite apparent that from the cheapness with which they may be mined, the thickness of the seams, their freedom from slate, and their general excellence, they will eventually furnish the steam coal necessary for the supply of the Gulf.

In a more recent report on the portion of the Warrior basin referred to, Prof. Stubbs (Professor Mineralogy and Chemistry in the Agricultural College of Alabama), says:

"Heading Lost creek we descended on its right bank till opposite Holly Grove, stopping on West Fork to examine the coal outcrops already mentioned. Near Holly Grove, on Lost creek, are the famous *Baker Beds*, separated from each other by about ten feet, the lower being over three feet and the upper nearly two feet. These beds have been worked in the past, and are said to have yielded coal of very fine quality. The relative position of these seams and their thicknesses, would indicate a continuation of the seams mentioned above. If they are, then we would have them dipping to the east and south, with rate of dip and rate of fall of stream about equal. This would indicate that the centre of our basin was east of Holly Grove. Along the bottom of Lost creek, in this vicinity, coal is constantly exposed, varying in thickness from two to three feet. At Guttery's canoe hole, on Dr. Miller's land and other places, the Baker seams occur. There is coal in the well of Dr. Hendon, at Holly Grove. Passing on down Lost creek we find coal outcropping at Boschill and Rutledge's. At the intersection of Cane and Lost creeks, numerous outcrops of great thickness and excellent quality occur. Coal has been mined from bed of Cane creek on lands of David Cobb, and is pronounced by Prof. Smith, as a 'hard, bright coal, with sufficient bony coal to make it a fine stocking coal, but not enough to injure it as a fuel.' Near Williams' mill, on Lost creek, a seam appears in a small ravine, some distance above level of the creek. Lower down the creek,

below the mouth of Wolfe, a seam of coal appears in many places, besides forming the bed of the river for several miles. At Mrs. Price's, on Falls branch, it is three feet thick. A shaft was once sunk on left bank of Lost creek near this place, and considerable quantities of coal taken therefrom. This same seam occurs in several places on Fanny's branch and on the east side of the Warrior river in Brake's bend. West of the river, at Van Hoose's mine, it has been profitably mined in ante bellum times.

"Baker's creek, which empties into the Warrior river several miles above Lost and on same side, is noted for the many outcrops of coal near its headwaters. A seam three to four feet thick of fine working and shipping qualities has been found on lands of Mrs. Bailey, Mr. Key, Mr. Tom Bradley, Mr. Jno. Gaines, Mt. Zion Church, and others. This is the same seam spoken of as the David Cobb's seam on Lost creek, and occurs everywhere in southwest part, T. 15, R. 7, upon the tributaries of Lost and Baker creeks."

As to quantity, therefore, there is the most abundant testimony to show that there are at least seven workable seams of coal in this part of the Warrior field superimposed one on the other. Towards the central basin of the Warrior, that part adjacent to the river, the seams are thicker and almost horizontal. There remains but one subject of investigation, and that is as to the quality of the coal.

QUALITIES OF THE WARRIOR COALS.

It may be safely stated that there are to be found in the great Warrior coal field every kind of bituminous coal necessary for the purposes of modern commerce and practical use. Although the greater part of coal mined at the present day is confined to the seams adjacent to the railroads, sufficient is known by experiment and analysis to justify the belief that the seams immediately opening on the river are even superior in quality to those mined on the Warrior plateau. The analyses show them to be of the very highest character for steam, coke, gas, and domestic purposes, whilst they are infinitely superior to the soft coals of the plateau or eastern edge of the field in mechanical texture and firmness, bearing handling, exposure to weather and transportation without liability to disintegration.

By the following table drawn by the celebrated geologist, Sir Charles Lyell, and published in the Journal of the Geological Society of London, the comparative merits of coals from various localities are shown:

Names of Coals.	Carbon.	Volatile Matter.	Ashes.
Alabama.....	89.96	12.96	6.08
Pennsylvania.....	71.80	22.00	6.20
Maryland—George Creek.....	70.76	16.03	13.21
Maryland—Frostburgh.....	74.38	15.28	10.34
Virginia—Blackheath.....	68.79	22.57	8.64
Virginia—Midlothian.....	53.33	33.25	13.42

Prof. H. S. Yaryan gives the following for

Sewanee—Tennessee.....	63.50	29.90	6.60
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The Virginia coals are regarded as the best bituminous coals in the United States.

From a "report of experiments made on the evaporative power and other qualities of coals," made in 1843, by the Navy Department of the United States (Ex. Doc., vol. 6, 1843), the following results were had in reference to other coals, which are here referred to, to show the superior character of Alabama coal:

	Carbon.	Volatile Matter.	Ashes.
Liverpool, Eng.....	54.90	39.96	4.62
Newcastle, Eng.....	57.00	36.83	5.40
Scotch.....	48.81	39.19	9.34
Pittsburg, Pa.....	54.93	36.76	7.07
Carrollton, Ind.....	58.44	33.99	4.97
Cumberland, Md.....	74.53	12.67	10.34

In this list Cumberland coal stands highest in carbon, but when compared with Sir Charles Lyell's analyses of Alabama coal it is found to be lower in carbon, equal in volatile matter and higher in ash.

The following analyses are taken from the report of the State Geologist of Alabama, Prof. E. A. Smith, 1880, and are of coals adjacent to the river:

	Pratt Seam in well.	William's Bank.	Horse Creek.	Frog- Ague.	Jaggers.	Townley Bank.	Lost Creek.
Specific gravity.....	1.333	1.312	1.365	1.401	1.233	1.310	1.310
Sulphur.....	.516	.604	.711	.482	.574	.710	.728
Moisture.....	2.969	1.525	1.848	3.799	3.091	3.007	2.261
Volatile Matter.....	29.78	26.17	28.36	26.22	29.04	29.08	33.78
Fixed Carbon.....	60.60	66.02	58.21	57.32	56.53	63.35	57.00
Ash.....	6.664	6.285	11.57	12.67	11.33	4.56	6.95

In the western edge of the central basin referred to, on the line of the newly constructed Georgia Pacific Railroad, a seam of coal has been opened and the business of mining regularly commenced. This seam is remarkable for having a thin seam of cannel coal immediately overlying the bituminous.

It is a beautiful, bright hard coal breaking into cubes, both in cleavage and in the plane of stratification, and is supposed to be the coming steam coal of the basin.

The most remarkable fact connected with this seam is its probable extent. The same seam mixed with cannel coal may be found on Lost creek as described by Prof. Tuomy, and is in all probability the identical coal found on Fanny's branch and Tom Bradley's and David Cobb's, as noted by Prof. Smith.

If this be a correct conclusion, the discovery is of incalculable importance, as the seam covers over 150 square miles of coal territory. A great part of which may be reached by water by Lost and Wolf creeks.

This coal has been thoroughly tested by the Mobile and Ohio Railroad and pronounced as a steam coal most valuable.

The following practical statement in relation to it is given:

CAMBRIA IRON COMPANY,

JOHNSTOWN, PA., May 13, 1884.

COL. W. BUTLER DUNCAN, President Mobile and Ohio R. R. Co.,
New York City:

Sir—On the 28th of last month I received through Agent McDowell, a barrel of Alabama coal from Corona. I am further informed that the bed from which this coal was taken is forty-five inches thick, with a parting of slaty matter about two to three inches thick.

This coal belongs to the bituminous family and inherits the peculiar elements of southern and southwestern coals. It mines out in coarse lumps, exhibiting on the planes of its bedding lenses of mineral charcoal. At right angles to the bedding plane thin slices of gypsum, which neutralize the effects of the sulphur in the combination. This coal is well adapted for use in locomotives or other steam engines, and should take a high rank as a steam coal from its large percentage of hydrogenous matter and low ash. It will also be found valuable for household purposes and heating generally. It will not make a good blacksmith coal, although it could be used for the purpose in ordinary wants. I submit the analysis of three coals so that you can compare the parts:

Localities.	Volatile Matter.	Fixed Carbon.	Ash.	Sulphur.	Phos.
Connellsville, Pa.	31.38	60.30	7.24	1.09	.01
Illinois, S. East.	41.27	51.16	3.94	.706	
Corona, Ala.	40.45	52.02	6.04	1.49	.015

Very good coke is being made at St. Johns, Ills., by the Illinois Central Coal Mining Company. It will be noticed how closely your coal is allied to the Illinois coal—its western neighbor. They using at the latter place a special oven for coking—the Thomas' patent oven, which has given very fair results. In this connection it may be noted that the utilization of the lye products of coal in coking is assuming an important position in connection with the coke industry.

Your coal, under a fair sampling of the lot placed for my use, shows special adaptability as follows:

1. Steam generating purposes.
2. Household purposes.
3. Coking.
4. Gas Making.
5. Blacksmithing.

All that is practicable in its preparation for any of the above uses is clean mining.

[Signed]

Very respectfully,
JNO. FULTON,
General Mining Engineer, C. I. Co.

LABORATORY OF CAMBRIA IRON COMPANY,
JOHNSTOWN, PA., May 13, 1884.

Analysis of sample of coal, received from Mobile and Ohio Railroad Company:-

Alabama Coal—Sample sent by Mr. Fulton, received at Laboratory May 1, 1884.

Remarks—Sample from Col. W. B. Duncan, President Mobile and Ohio Railroad Company.

Carbon (fixed).....	52.02	..
Phosphorus.....	..	.015
Sulphur.....	1.49	..
Ash.....	6.04	..
Total Volatile Matter.....	40.45	..
Combustible Volatile Matter.....	38.59	..
Coke—58.81 per cent.		

[Signed]

T. T. MORRELL, Chemist.

The most accurate and practical test ever made of Alabama coals was made by the Louisville and Nashville Railroad in 1878 with a stationary boiler, to ascertain their evaporative value. Taking Pittsburg as a standard, this shows the relative comparative value of the coals used on that railroad.

	Pounds of water evap- rated by one pound of fuel.	Per cent. of ash.	Relative evaporative value.
Pittsburg coal, run of the mine.....	8.16	13	100.
Warrior coal, run of the mine.....	8.15	16	99.9
Pine Hill, block coal, (Ky.).....	7.63	10 6-100	93.5
Livingston, run of the mine.....	7.59	19 8-100	93.
Pittsburg, not screened.....	7.44	13	9.
Guthrie, nut coal, (Ky.).....	7.00	22	85.7
Pine Hill, run of the mines, (Ky.).....	6.96	18	85.3
Pender Mines, run of the mines, No 1.....	6.94	20 5-100	85.
Pine Hill, run of the mines, No. 2.....	6.77	16	82.9
New Castle, run of the mines, (Ala.).....	6.78	22	80.6
Saint Charles, run of the mines, (Ky.).....	6.51	21 3-100	79.8
Saint Charles, nut coal, (Ky.).....	6.47	17	79.3
Cahawba, slack, (Ala.).....	6.09	27	74.6
Fish Point, run of the mine, (Ky.).....	7.18	19 6-100	88.
Cahawba, black-shale bed, (Ala.).....	7.09	12 5-100	86.
Sewanee, select, (Tenn.).....	6.57	8	80.5

It will be seen from the foregoing statement that the value of Warrior coal, as a generator of steam, is but a trifle lower than Pittsburg, and almost equal to it. It will also be borne in mind that it came from a new mine on the very edge or rim of the Warrior plateau, whilst the Pittsburg coal has been mined for many years.

“For the coking character of the Black Warrior coals, the subjoined analysis of the best, both from this field and the Cahawba, are given :

	Water.	Bitumen.	Fixed Carbon.	Ash.	Sulphur.
Warrior coal.....	16	25.09	72.14	2.27	.34
Cahawba.....	17	25.97	70.10	3.68	.17

GAS COAL.

“The value of coal for the production of gas, other things being equal, will depend upon the amount of hydrogen they contain.” In the five following specimens Sir Charles Lyell found the hydrogen to stand thus :

Clover Hill, Va.....	5.23
Black Heath, Va.....	4.08
Deep Run, Va.....	4.77
Powells, Va.....	4.23
Alabama.....	5.13

“There are also highly bituminous coals present among the beds, belonging to the Warrior basin, which, being the best for gas purposes, analyses of two of them are here given :

	Bituminous Combustible Matter.	Fixed Carbon.	Ash.	Water.	Sulphur.
No. 1.....	40.60	54.07	3.09	1.18	1.06
No. 2.....	34.49	60.09	4.32	.93	.17

In 1874 a cargo of Alabama coal was shipped to Havana and sold to the Gas Company there. We are permitted to make use of an extract from the letter received after it had been tested.

“PETER KNOWLES, Esq. :

“HAVANA, 13 March, 1874.

“Dear Sir—As you are aware, we sold the cargo of Alabama coal, ex-sch. Evaline, to the Gas Company at \$9.00, Spanish gold, that they might fairly test the same. They got the following results :

Montevallo gives.....	8750 feet of gas.
Helena gives.....	8743 feet of gas.
New Castle gives.....	8781 feet of gas, and 1621 pounds of coke.

The latter will suit them best as it gives about 200 pounds per ton more coke than Liverpool. * * * *

“Yours, very truly,

“LAWTON BROS.”

The value of coal, as ordinary fuel, is derived from the carbon and hydrogen. Now these analyses in this relation settle the position of Alabama coal.

(Prof. Tuomy, Geo. Rep. Ala., 1859.)

"Chemical analyses of coals serve only for comparison, the physical structure being of at least equal importance. The chemist determines the materials which make up the coal, but not the manner in which the constituents are arranged. The heating power is largely dependant upon physical structure, and can only be determined by actual experiment. While the analyses given above place these coals on a par with the best bituminous coals of this country, their physical properties, it is believed, will give to them a very prominent position in the markets of the world."—Professor Stubbs.

But the practical value of American steam coal does not rest on the foregoing statements. For the past five years the government of the United States has been using Warrior coal for steam purposes on its revenue cutters, coast-survey vessels, lighthouse tenders and engineer boats in the Gulf. The engineer officers of the Revenue Marine, gentlemen thoroughly skilled in their profession and familiar with the steaming qualities of coals furnished the revenue cutters all over the country, bear the very highest testimony to the quality of the Alabama coal.

We are permitted to use the following statements made by the chief engineers of the United States revenue steamers, supplied in Mobile with coal:

U. S. REVENUE MARINE STR. LOUIS McLANE,
MOBILE, ALA, January 29, 1884.

GEN. BURKE, Collector of Customs, Mobile, Ala.:

Sir—Agreeable to your request, asking for a practical statement of Alabama coals as compared with English coals for steaming purposes, I can say, that from an experience of nearly twenty years, I have not found an English or other foreign coal that would compare with the coal of the Warrior mines of Alabama. This coal is a good free burner with natural draft; is free from clinker, and has all the qualities of an excellent steaming coal.

Very respectfully,

SAMUEL H. MAGEE,
Engineer in charge.

U. S. REVENUE STEAMER SEWARD,
MOBILE, ALA., November 16, 1881.

J. W. BURKE, Esq., Mobile:

Dear Sir:

Your note requesting my experience and observation in regard to the steam coal of Alabama is received, and I beg leave to say in reply, in my opinion the Warrior coal is the best substitute for Cumberland that I have known, and is an excellent blacksmith coal. The Alabama mines are new and their yield are scarcely yet representative in quality. Some of them may compare favorably with the older mines of the Middle and Eastern States.

Respectfully,
J. E. JEFFRIES,
Chief Engineer United States Revenue Marine,
Revenue Steamer Seward.

From all sources come the testimony that, for the production of steam, the soft coal of the Warrior is superior to Welsh steam coal, and for the purposes of the household and the production of gas the compact harder coals of the Warrior basin are unexcelled.

ECONOMIC RELATIONS.

From the foregoing statements it is shown that the quantity and quality of Alabama coal are all that can be desired.

The next subject we shall consider is that of the supply at tide water, in order to build up a great national industry in a section of the country where it is required as an absolute necessity.

[REPORT OF U. S. ENGINEER, MAJ. DAMRELL.]

NATIONAL IMPORTANCE OF THE WORK OF IMPROVEMENT.

"The advantage to Alabama of a navigable river which shall traverse the most important coal field in the State, and which shall afford cheap transportation to the Gulf, not only for the coal but also of the other products of the country, cannot be overestimated. A moment's reflection will show that however great may be the benefit to the State of this work of improvement, the advantages to the national government will not be less.

An unfailing supply of good and cheap coal at the Gulf is of the first importance to the navy. The supply of coal has hitherto come by the Ohio river. During the winter months, as is well known, traffic upon that river is often interrupted by ice, and we have lately seen that even during the summer months a coal famine may be experienced in the Lower Mississippi and Gulf regions because of low-water in the Ohio.

During the time that the Ohio river is closed by ice, the Warrior would be in its best condition for transporting coal, and there is no likelihood that transportation on this river will ever be interrupted by reason of low-water, for during the unprecedented drought of the past summer (1879) there was always a sufficiency of water in the Warrior, had it been provided with locks and dams, to have furnished uninterrupted transportation for the coal barges. (Report U. S. Engineer Warrior improvement, 1880.)

SURVEY OF BLACK WARRIOR RIVER, FROM TUSCALOOSA TO FORKS
OF SIPSEY AND MULBERRY, ALABAMA.

OFFICE OF UNITED STATES ENGINEER,
Mobile, Ala., August 15, 1880.

GENERAL: I have the honor of submitting herewith a report of a survey of the Black Warrior River from Tuscaloosa to Sipsey Fork, made by assistant, Eugene A. Smith. The survey was made in compliance with the provisions of the act of Congress approved March 3, 1879.

The Warrior River is navigable as far as Tuscaloosa during high water; the principal obstructions to its navigation, at low water, to that point, being sunken logs, snags, gravel bars, and a few rock-reefs. Above Tuscaloosa the river changes its character entirely, and in its present condition is not navigable at any stage of the river, forming a series of lakes and falls over rock-ledges which completely impede navigation.

On account of this difference in the character of what are called the Lower Warrior (from Demopolis to Tuscaloosa) and the Upper Warrior, (above Tuscaloosa to Locust Fork,) separate estimates are submitted for each. For the improvement of the former, the cost of two channels, one 50 feet wide by 3 feet deep at low water, and one 80 feet wide by 4 feet deep at low water, by means of removing logs, gravel, and rocks, and the construction of jetties, have been estimated for, while for the latter, or Upper Warrior, the only practicable method of improvement, slack-water navigation, by means of dams and locks, has been considered.

The Black Warrior River penetrates the very centre of the coal and iron region of Alabama, and its opening to navigation as far as Locust Fork would furnish cheap water-transportation to the Gulf for the finest coal and iron-ore in the State, as well as for the agricultural products of the country adjacent to the river, and I consider its permanent improvement very desirable. The value, to the Government, of securing cheap and easy access to the Warrior coal-fields would be very great, and might, in certain contingencies, become of vast importance.

The report shows that the river can be improved by the use of locks and dams, at an estimated cost of \$400,533, \$760,000, or \$1,200,000, according to the character of the work, so as to accommodate the business for which the improvement is especially intended—the transportation of coal in barges from the coal-fields. The enormous quantity of coal in the country through which this portion of the river flows, and its superior quality and accessibility, as shown by this report, proves conclusively the importance of the improvement which would render it available for the use of the government, the people of the Gulf States, and the steamers of all nations employed in the commerce of the Gulf.

The complete improvement, with masonry, dam, and locks of cut stone, at an estimated cost of \$1,200,000, which would be of a permanent character when completed, is therefore recommended as required and warranted, and an appropriation of \$200,000 is recommended to begin this work.

The river is at present navigable at high-water only, and even then sufficiently dangerous to put a stop to all commerce on the river, although barges have frequently been floated down to Mobile loaded with coal.

The amount of commerce that would spring up with a river improved as suggested, is only conjectural, but would evidently be sufficient to warrant the outlay, when it is considered this section of the country and the commerce of the Gulf is now supplied principally from Pittsburg by a route often closed in the winter months by ice, a contingency to which this would not be liable.

Very respectfully, your obedient servant,

A. N. DAMRELL, *Captain of Engineers.*

Brig. Gen. H. G. WRIGHT,

Chief of Engineers, U. S. A.

In this connection the national character of this enterprise was recognized as far back as 1828, under the administration of President Jackson, for in that year Congress declared, that "*the Tennessee, Coosa, Cahawba and Black Warrior rivers, within the State of Alabama, shall be forever free from toll for all property belonging to the United States, and for all persons in their service, and for all citizens of the United States, except as to such tolls as may be allowed by act of Congress;*" and this law may now be found under title "Rivers and Harbors." Sec. 5244, Revised Statutes United States.

In 1836 sales of the public lands were made in Alabama, out of which a fund was created for the improvement of those rivers, and some of the money so raised was expended on the Warrior. The improvements were, however, of such a character as to be of little value. "The plan appears to be good but the execution was defec-

tive," says Prof. Tuomy. "The jetties were in many cases not connected with the banks, and not reaching above high water, become dangerous submerged islands to boats coming down at high water. Later improvements were altogether conducted with the view to the removal of obstructions to high water navigation, and consequently it became necessary to undo in many cases what had been done at considerable expense."

These facts are mentioned to show that those rivers, and especially the Warrior, were the subjects of national solicitude fifty-five years ago. The longheaded men of those days saw the splendid future before this magnificent coal field and recognized the fact by declaring that the streams that led into it should be forever free to all citizens of the United States, great national coal channels, or highways, which at some day would be called to play a most important part in the prosperity and commercial purposes of the country. Nor are we now without the most convincing proofs of their wisdom, for this may be seen from the large saving made by the United States Government at the Gulf ports since the introduction of Alabama coal. As late as 1878 the Government paid for the coal furnished its vessels at the Gulf ports from \$8.00 to \$12.00 per ton. To-day coal is furnished at the rate of \$3.40 per ton of 2000 lbs. at Mobile, and the consequent saving to the Government has been equal to \$40,000 in three years. This annual saving on a few vessels is equal to a sum sufficient to pay the annual interest on the money necessary to render the Warrior navigable to coal barges nine months in the year at the rate the Government pays for money.

Now, the price of coal being \$3.40, and the cost of railroad transportation being \$2.00 of that amount, it is quite evident that unless a cheaper means of transportation be provided, this great coal deposit will remain as it is, supplying only the home demand of those localities adjacent to the field. The cost of opening the Warrior to navigation will, in a few years, pay for itself in furnishing to the Government coal at \$1.50 per ton less than it now pays, and when these figures are applied to the vast commerce of the Gulf and the Navy the subject is one of incalculable importance.

In 1874 Congress voted a small appropriation for the survey and examination of the Warrior, and in 1875 the report of that examination, conducted by an eminent engineer under the direction of Maj. A. N. Damrell, (U. S. Engineer Corps), was presented to Congress.

Again in 1879 another examination and survey was authorized by Congress, and the report of Prof. Eugene A. Smith, the accomplished State Geologist, was the result. This report, which has done so much towards bringing the immense mineral resources of the Warrior basin to public notice, was made in 1880.

The report shows that the river can be improved by the use of locks and dams at an estimated cost respectively of \$400,553, \$760,000, and \$1,200,000, depending on the permanency and character of the work to be done. The estimated cost of the improvement, as presented by the report of Col. Horace Harding in 1875, is \$431,000.

It may be thought by some that the expense of mining on the Warrior river is placed at too low an estimate judging from the expense of mining in other parts of the country and in England and Europe, but when it is considered that the mining in those countries is all done thousands of feet deep in the bowels of the earth and in a manner involving immense cost and mechanical effort it is not to be wondered at. Some of the British shafts are 2500 feet deep and the Kuttenger pit in Bohemia had to be abandoned on account of the high temperature at a depth of 3,778 feet.

For years to come millions tons of coal may be mined in the Warrior basin by drift mining and by the means of slopes with a very gentle inclination, and delivered to barges at the very mouth of the mine.

At the present time coal is lower than ever known before, as appears from the following list of prices taken from the "Coal Trade Journal" of January 2d, 1884.

WHOLESALE PRICES OF BITUMINOUS COAL.

The following is a recapitulation of the nominal prices-current for this variety of coal at that date.

Cumberland, at Baltimore.....	\$3 00	at	N. Y.	\$4 25
Cumberland, at Georgetown.....	3 00	at	N. Y.	4 25
Clearfield, at Baltimore.....	3 00	at	N. Y.	4 25
Clearfield, at Philadelphia.....	3 50	at	N. Y.	4 25
Clearfield, at South Amboy.....	4 00	at	N. Y.	4 25
Westmoreland and Penn Gas, South Amboy.....	4 50	at	N. Y.	4 75
Youghiogheny, Scotts, at Baltimore.....	3 60	at	N. Y.	4 75
Montauk Gas, at Baltimore.....	3 50	at	N. Y.	4 75
Cannelton Gas Cannel, at Newport News.....	8 50	at	N. Y.	9 50
Provincial Gas and Steam coal.....		at	N. Y.	3 75
Konawha Gas, at Newport News, Va.....	3 50	at	N. Y.	4 75

And yet it is confidently expected that, with water transportation on the Warrior and the Cahaba unimpeded to the Gulf, the

price of steam coal can, by utilizing the abundant sources of America economical methods, be reduced to \$2.00 per ton at Mobile.

WHOLESALE PRICES OF BITUMINOUS COAL IN ENGLAND.

The following authentic information on this point is deemed sufficient:

UNITED STATES CONSULATE,
RICHMOND BUILDINGS, 26 Raphael Street,
LIVERPOOL, April 10, 1884.

J. W. BURKE, Esq., Mobile.

Dear Sir:

In reply to your inquiry respecting the price of steam coal at this port, I enclose herewith, prices as given by two old established firms of coal merchants who are large exporters of coal to South America.

Respectfully yours,
S. B. PACKARD, Consul.

PRICES.

Lairds Welsh Hartley Steam.....	10s.
Wigan Gas Coal.....	10s. 6d.
Wigan Steam Coal.....	9s. 6d.

The price of steam coal at present in England is unusually low. Cargoes were shipped to Aspinwall last year for which 11s. 6d. to 12s. 6d. per ton were paid. Add to this the freight at £1. (\$5.00) per ton, and the price of steam coal laid down at Aspinwall will cost at the lowest estimate £1, 10s. per ton or about \$7.50 in American money.

COMPARISON OF DISTANCES.

The distance from Mobile to Aspinwall is 1310 miles, and from Newcastle, England, (a principal exporting point for steam coal) 5340 miles. The American ship loading at Mobile can make at least three voyages and deliver three cargoes whilst the British vessel is delivering but one and has returned to her home port to reload. The case stands better with the West Indie and Mexico, which countries are at our doors. With Alabama coal delivered at Mobile at \$2.00 per ton, we would see one of the proudest of American commercial triumphs.

Even with the price of British coal as low as Alabama we still would have the preponderating advantage in distance. But in the matter of cost at tide water it is absolutely certain that with the water ways to the Gulf of Mexico open to navigation coal may be delivered at the tide at a lower price than in Great Britain.

MOBILE THE GREAT COAL EXPORTING DEPOT OF THE FUTURE.

The matter of handling coal at tide-water and the facilities for exportation are subjects second only in importance to the transportation by water to the sea coast. There is not a city on the American sea board so eligibly situated for this purpose than the Gulf City. The Bay of Mobile is a beautiful sheet of water, in length about thirty-two miles with an average width of ten miles. It is perfectly land-locked, a vessel once over the outer bar being perfectly safe in all kinds of weather. Nature has done much for this magnificent harbor.

In the year 1771, one hundred and thirteen years ago, the British Admiralty published a Chart of Mobile Bay, which is now, in possession of Major A. N. Damrell, U. S. Engineer Corps, in Mobile.

At that time there was but ten feet of water on the outer bar or entrance to the bay. At the present date there is twenty-four feet at mean low tide. This has been accomplished by the operations of the forces of nature, the winds and tides, and whilst millions of dollars have been expended on improving the approaches to the various harbors on the Atlantic and Gulf coasts, not one cent has ever been expended on the bar at the entrance to Mobile Bay.

It is stated as a fact, ascertained by the engineers, that a greater volume of water flows daily out of Mobile Bay into the ocean than that which is discharged by the Mississippi at Port Eads. This is made up by the reflux of the tides, supplemented by the volume of water from the rivers of the State, nearly all of which flow into the gulf at Mobile. Thus, this immense volume of water flowing out by the ship channel at Fort Morgan represents one force, that of the scouring one, whilst the southeast gales and the sea represent the other, piling up the sand, forming a natural jetty or bank, the result of which is a natural and constantly increasing deepening of the channel.

Inside of the bar the water deepens, until in front of Fort Morgan there is an average depth of fifty feet. This magnificent harbor is capable of floating in security the navies of the world.

The improvement of the channel from the lower anchorage to the city (26 miles) was begun in 1827, but no permanent results were obtained until the improvement commenced in 1870, which has resulted in giving a ship channel of 17 feet at mean low tide to the city

wharves. This work is found to be permanent, as there has been no evidence of filling since the completion of the cut (75 feet wide), and the material dredged is a stiff blue clay, comparatively free from sand or alluvial deposit.

For miles along the shores of this magnificent sheet of water and along the banks of Mobile River, the most abundant facilities for unloading and loading coal exist. Quick to take advantage of the rising tide of prosperity now flowing in upon the city since the completion of the ship channel by the Government of the United States, those accurate commercial barometers, the railroads, have constructed magnificent wharves on the city front, and to the enterprise of the Louisville and Nashville and the Mobile and Ohio Railroads, Mobile is indebted for wharves, which for completeness and capacity are rarely excelled by any port in the country.

Crowded with ships from every clime, unloading and loading their cargoes in front of the city, steamers discharging their loads of cotton brought down from the upper country, steamtugs busily moving about among the fleet or towing immense rafts of timber, one cannot help wondering at the magical change brought about by the timely and profitable investment of a few thousand dollars by the Government in the improvement of this harbor.

These are but the initial signs of the great commercial future that awaits Mobile.

Situated at the point where the rivers of the State mingle their waters on their way to the ocean, at the head of one of the finest sheets of tide water in the country, Mobile has what nature bestowed upon her and what man cannot deprive her of, geographical position in relation to commerce. She is the only city in America where coal can be mined within 300 miles of the tide and floated with trifling expense thereto by the natural water ways, and this important fact alone must necessarily command for her commercial pre-eminence in proportion as those great natural advantages are developed and improved.

The presentation of these views at this time is to draw public attention to the national character of this work. The section of the Revised Statutes of the United States referred to absolutely confines the jurisdiction of the subject to Congress, for, no improvement with a view to remunerative profit can be made without its express sanction. It is a very remarkable fact that for fifty-five years little

or no effort commensurate with the importance of the subject, has been made to inform the country on this singular provision of the law by which Congress has assumed absolute control of those Alabama coal streams. It was only when, in the codification of the United States laws it became incorporated as a section of the Revised Statutes that the important fact was noticed. When Congress declared them forever "toll free" for all property of the United States, and to all citizens of the United States, it virtually undertook to *nationalize* them, and as they require improvement in order to render them navigable streams, the conclusion is inevitable that Congress had intended to give effect to this provision of the law and appropriate sufficient money to accomplish that which it absolutely prohibits to private enterprise. Any other construction would be senseless, since it would be forever closing to public use avenues to great wealth which by law were declared to be the property of the whole people of America. It is, therefore, due to the commercial interests of the country at large, to our just desire to maintain our ascendancy in the Gulf of Mexico and on the Isthmus of Panama, to the people of Alabama, that the highways to those magnificent coal fields, the Warrior, Cahawba and Coosa, should be at once cleared of obstructions to navigation. When this entire subject is gone over and properly considered, it will be found second in importance only to the improvement of the Mississippi river, and in point of economy, will reimburse the Government in a few years for the comparatively trifling outlay rendered necessary to complete an undertaking so full of wealth to the country and so valuable an adjunct to our national power and progress.

In a recent article on "*Iron Ship Building in Alabama*" the *New Orleans Times-Democrat* has the following, which on account of its terseness and perspicuity we take the liberty of reproducing here:

IRON SHIP BUILDING IN ALABAMA.

A justly celebrated Southern writer has lately called the attention of Northern capitalists to the promising field for an investment of capital in the coal and iron deposits of Alabama.

It is more than probable that the vast extent and the actual value of these important Southern material resources are as yet but feebly comprehended by the general American public. While the Pennsylvania coal and iron deposits are justly celebrated throughout the world for their extent and productiveness, the Alabama mines possess

a vast advantage over the former from the fact that the coal and iron deposits are juxtaposed, for the fuel for the working of the iron ore is contiguous to the deposits of the latter. As a consequence, the production of pig-iron has already become a prominent Southern industry, while the foundries of the State of Alabama can to-day produce it at the rate of \$6.00 per ton cheaper than it can be made in Pennsylvania.

In the latter State this industry, thanks to the protective system that has fostered its infancy and strengthened its growth, is on a most promising footing. The Alabama iron mills, fostered by a few more years of similar protection, will undoubtedly eclipse their Northern rivals, while that Gulf State is destined to take a prominent place among the iron and coal producing regions of the world.

While the English iron makers and coal miners are compelled to descend deep into the bowels of the earth to extract the precious deposits, both iron and coal, to an almost inexhaustible extent, are found on the very surface of the ground, in paying quantity and quality, in many localities of Alabama. It has been estimated that Alabama coal can be profitably mined at from ten cents to a dollar per ton. Coal from these deposits is daily hauled by rail to Central Texas, while experts have asserted that it can be placed in New Orleans and retailed at \$2.50 per ton.

As iron and coal exist in juxtaposition in many localities in Alabama, it cannot be a matter of surprise if the iron workers of the State can make pig-iron at \$6.00 a ton cheaper than it can be produced in any other part of the Union. If pig-iron can be made so cheap there is no reason why a great economy in the production of iron manufactures of all kinds cannot also be obtained, and the rolling mills and foundries of the Gulf State be made to vie with, if not to excel, their rivals of the North, both in cheapness of production and the quality of manufacture. If this premise be true we cannot see why Alabama, with its extended and well-protected sea coast and its fairly deep water ports, should not, at some time in the near future, build all the iron ships requisite for the freightage of American commerce to the markets of the world.

We will suppose, for instance, that as the Alabama production of the raw material—pig iron—is \$6.00 per ton cheaper than it is in Pennsylvania, and the preparation of the metal for ship building purposes costs no more in the Alabama mills than in those of Pennsylvania, an iron ship of 3000 tons can be built at Mobile \$10,800 cheaper than on the Delaware; that is, in case the tariff for wages for workmen, etc., rules the same in each locality. The weight of iron used in the construction of a 3000-ton ship is about 1800 tons. This, at \$6.00 per ton economy in the production of pig-iron, will make \$10,800, as above stated.

Thus, when the vast coal and iron resources of Alabama become duly appreciated, and ample capital seeks investment in their devel-

opment, there is no reason why, with cheaper material and equality on other points, the Gulf State should not become the principal iron ship building locality of the Republic.

THE WORK COMMENCED.

At last, comes the gratifying information that Congress has appropriated \$50,000 for the commencement of this great national improvement, and it is earnestly to be hoped that the work will be pushed forward to early completion, so that by the time those great enterprises, the Panama Canal and the Eads' Ship Railway, shall have been finished and opened to the commerce of the world, steam colliers can take on their cargoes of coal at Mobile and deliver them at Aspinwall and Tehuantepec at such rates as to defy foreign competition.

In a few years we may safely predict a very large investment of capital in the business in the mining, transportation and selling of coal. Cheap fuel is a veritable and never-failing city builder. With it invariably come population, manufactures, and all branches of diversified industry, and the advent of the coal barge in Mobile will surely mark an epoch in her history full of promise for the future.

This is no highly colored picture.

They are predictions founded on the rise, progress and success of the large manufacturing cities of the country, all of which owe their prosperity mainly to cheap fuel and without which they would surely decline. The Warrior coal barge can and will do for Mobile, Pensacola and New Orleans, what the Pittsburg coal barge has done and is now doing for Cincinnati, Louisville and the manufacturing towns on the Ohio. Let us inscribe on our banners "Cheap Coal!" Let us secure this and prosperity will flow in upon us as noiselessly and surely as the tides of the Golden Gulf rise before our eyes in their daily recurrence, and thus be the realization of a bright fact which must tend towards creating a new source of national wealth and—make Mobile

THE GREAT COAL PORT OF AMERICA.

PROGRESS.

Since the publication of the facts contained in the foregoing pages of this little pamphlet, the attention of the country has been thoroughly interested in the very remarkable subject to which they refer. The views of Mr. McClure, editor of the *Philadelphia Times*, and his graphic description of the progress of the industrial movement in Alabama as communicated to his paper last January, during his visit to the State, constitute a volume of such valuable information and from so high a source, that it is deemed of sufficient importance to republish his letters here.

MOBILE, January 17, 1885.

Mobile is one of the few important natural gateways to the world of waters in the South, and second only to the Mississippi outlet in the industry it should inspire and the commerce it should command. The beautiful bay on which Mobile is situated has natural tributaries reaching far into almost boundless sources of natural wealth, which must at no distant day build up one of the grandest empires of the New South; and yet the Mobile of the present gives no token of its better destiny, and has only faded monuments of its past commerce and wealth. It teaches more pointedly than any other centre of trade in the South, the peril of a State that relies upon a single staple product and the peril of a city whose business is limited to a single productive industry. Before the war Mobile handled eight hundred thousand bales of cotton annually, and that alone gave it a commerce that made it one of the most prosperous centres of the coast with uncommon wealth, culture and prosperity. The necessities of war quickened the energies of the South; new highways were opened for armies and for trade, and they diverted trade to new centres, leaving Mobile with two-thirds of her cotton shipments lost in the race. Cotton was the one staple product of Alabama, and the one source of the

commerce of Mobile, and when cotton was attracted to other commercial centres, there was nothing left for Mobile but paralysis and decay. The same people remain the same; culture is maintained in its proverbially hospitable people; the same earnest, hopeful effort prevails in her intelligent business circles; but neither population, culture nor business effort can succeed in the unequal contest that has confronted this city of such exceptional natural advantages, and the unerring index of departed business and thrift are noted in the tenantless temples of commerce and in the blighted chaplets of commercial achievement. The natural conclusion that would be accepted by the North, is that Mobile must be the author of its own decline; but it is not the truth. The war left this city impoverished as it left the South generally, and the vast outlay necessary to make the marvellous natural advantages of the port available, has not been within the power of either Mobile or Alabama.

THE MATCHLESS RESOURCES OF THE STATE.

To understand the causes which have left Mobile without advancement for twenty years after peace, and appreciate the future possibilities of this city, it is necessary to take a comprehensive view of the State of Alabama. I have studied the resources and opportunities of the State with special interest, because they are certain to revolutionize some of our chief sources of wealth in Pennsylvania; and the more they are studied, the more clear it must become to every intelligent mind, that England is not to-day more the rival of the Keystone State in the future production of iron and coal than is Alabama. There is not a source of mineral wealth in Pennsylvania, excepting only our oil product, that is not found in Alabama in equal or greater abundance, with the matchless advantages of climate, of easier and cheaper production and of vastly cheaper transportation. Nature's great gifts to Pennsylvania have been not only liberally supplemented in Alabama, but to them have been added every possible natural advantage for their cheap development and delivery to the markets of the world. If half the capital and business direction that have been given to make Pennsylvania peerless in the production of mineral wealth, had been given to Alabama, her productive wealth would be as great as that

of the iron State and her population would be nearer five millions than the million and a quarter now scattered over the boundless but almost untouched riches of this sunny commonwealth. Think of a State with over five thousand square miles of productive coal fields, whose coal is now sold at a fair profit in New Orleans at less than \$4.00 per ton. It is mainly of the best quality, alike for commercial, manufacturing and domestic purposes; it is in large veins; it is more easily mined than our most favorably located bituminous coal fields in the North; and in large portions of the coal fields there is good iron in abundance, much of it requiring no actual mining at all, and with the iron and coal is found the limestone. Birmingham is a feeble forecast of what Alabama may do. There a city of a dozen thousands presents a hive of industry where a single house stood at a railway crossing little more than a decade back. It is the one point of Alabama where iron and coal abound, that has happened to be reached by transportation, and it has sprung up as if by magic to point out not only the possibilities but the inevitable and wonderful destiny of the State. It is admitted that iron can now be produced in this State \$6.00 per ton cheaper than in the reasonably favored iron centres of Pennsylvania; and that it is a certain index of the industrial revolution that is rapidly approaching. What has been done in Birmingham not only can be done as well in many other parts of the State; but it can be even more profitably done in Birmingham and elsewhere in Alabama as soon as the great natural highways of the State shall be made available; and no citizen of the North of fair intelligence can review the slumbering wealth of Alabama and the waterways which offer the cheapest transportation, without accepting the conclusion that the next generation will see this State an iron and coal centre equal if not surpassing Pennsylvania, and Mobile the great coal depot of the coast. It is this rational hope to which this balmy city of the South clings in portraying the revival of her commerce; the renewal and enlargement of her business temples and the more than restoration of her lost wealth and grandeur.

THE NATURAL HIGHWAYS OF ALABAMA.

Not a vessel graces the broad rivers of Pennsylvania beyond the coast in the east. The Susquehanna, the Schuylkill, the Dela-

ware and the Juniata, are simply beautiful but useless outlets for our mountain springs as they go murmuring to the sea; but Mobile is the outlet of many rivers which penetrate into the leading centres of wealth in Alabama, and the finest bay of the continent connects them with the great highways of the world. With no more expenditure than has been wasted on mud creeks and summer mountain streams in a single river and harbor appropriation bill, the Alabama river could be made navigable through the heart of the State away up to Rome, in the northern part of Georgia, and the now easy navigation of the Tombigbee could be extended up the Warrior to the great centre of iron and coal, west of Birmingham. No State not reached by the Father of Waters and its tributaries approaches Alabama in the magnificence of her natural highways, and even the Mississippi, although commanding tribute from two-thirds of the States of the Union, offers no such facilities for the interior development of any one State, as do the water-ways of Alabama. An expenditure of from half to three-quarters of a million, would make uninterrupted water navigation from the Warrior coal and iron region to the sea, and two millions more would make the Alabama bring the fruits of her fields and mines from the far north and northeastern part of the State, and drawn upon north-western Georgia to swell the commerce of Mobile. The channel of Mobile bay has been already greatly improved, and every foot of depth attained has held its own. The pressure of the new energies of the New South must hasten the needed improvement of these great natural gifts to the commerce of the South, and when the river arteries of trade and the channel of the bay shall have been completed, the development of wealth in Alabama must be exceptional if not unexampled in the history of our substantial progress. As early as the administration of the second Adams the importance of these water-ways was appreciated by the Government, but cotton was king; it met every apparent want of the South, and as there was no supreme necessity to press these improvements, they readily bowed to the more imperious demands of trade in other sections of the Union.

THE FUTURE OF MOBILE.

It is no idle dream that makes the people of this once pros-

perous but now languishing port, hopeful of a renewed and greatly increased commercial prosperity in the near future. I regard the extension of her wonderful water-ways and the needed improvement of the channel of the bay as vastly more legitimate and important than the Hennepin canal. The one is the traditional and accepted policy of the Government; the other is straining the most liberal ideas of legitimate public improvements by Congress; and both the rivers and the harbor have already been recognized in past appropriations as demanding the generous aid of the country. When completed, as I assume they must be at an early day, Pennsylvania must look to her laurels; but there is no sound public policy that can make the interests of one State seek to hinder the development of a sister State that may outstrip the hitherto successful in the race for development and wealth. Whenever Alabama can make cheaper iron than Pennsylvania to supply the country, Pennsylvania must transfer the rude music of her forges to the Sunny South; and whenever Alabama can supply the world with cheaper coal than Pennsylvania, the world will buy of Alabama and Pennsylvania capital and energy will not take pause over sentimental theories, but hasten to follow the larger profits of industry. With water transportation from the immense coal fields of Alabama, and Mobile completed for the largest shipping, no State in the Union and no nation of the world will be able to compete with this State in supplying the Gulf of Mexico, the West Indies and Central and South America with coal. England now draws some four millions annually from those countries for coal, while the United States draws little more than a quarter of a million; and the supremacy of Mobile as a cotton centre would be more than restored. Mobile would be literally the great gateway to the waters of the world for the Southern coal trade if given the benefit of the gifts nature has bestowed upon her; and what interest or what section can assume to hinder so great a consummation? There are 4,000 square miles of virgin pine forest, with large supplies of cypress and white oak, which would be made marketable by these completed water-ways, and the cotton belt of Alabama and Eastern Mississippi that sought Mobile before the war, produces over a million bales annually. These are stubborn facts; facts which the people of Mobile are worshipping as the early salvation of both city and State; facts which the people of Pennsylvania and

the North must look in the face soon at the latest, and the sooner the better. They foreshadow the same mutations in industry, trade and wealth, which have left their inexorable lessons on all ages and peoples of the past, and I welcome them as certain to give lustre to another of the many unpolished jewels of the Republic.

A. K. M.

BIRMINGHAM, January 28.

If you want to see an infant Pennsylvania, with all the vigor and go-ahead activeness of the regulation American boy just ready to bounce out of long clothes into high-legged boots, come to Birmingham, in the heart of Alabama. It is Young America personified and improved. It has more push and better bottom than any suddenly created city on the continent, and it is a revelation to both North and South. Towns have sprung up as suddenly in the oil regions and in new mining camps in the far western mountains, but they have perished as speedily as they were created. Birmingham has all the solidity of Pittsburg or Reading or Allentown, and it requires no labored investigation to learn that, matchless as has been the growth of this new-born city, it is yet in its infancy and certain to attain the earliest and most vigorous manhood. Twelve years ago the solitude of Birmingham was attested by a single ordinary farm house; but two railways finally crossed each other there and this invited capitalists to investigate the great coal, iron and limestone beds of Central Alabama. Stories had been long told of them that were regarded as akin to fable, and when peace came and railroads began to traverse the New South, capitalists came to the little house on the cross-railways, planted their investments about it, and now a city of nearly twenty thousand population, with boundless energy and more than common thrift, has begun the inevitable revolution in the iron trade of the continent. Some idea of the substantial growth of the city may be learned from the valuation of property for taxable purposes in the county of Jefferson, that was two millions in 1882 and was nine millions in 1884. It has none of the signs of heedless haste for temporary use exhibited in the new oil and mining towns. It has one of the finest opera houses in the South; its residences rival the beauty of Atlanta homes; its stores and business houses present all the best qualities of Northern

energy and method, and its large class of skilled operatives enjoy a measure of comfort that is exceptional in Southern industry. It is largely a Northern creation, but it is worthy of note how thoroughly the Birmingham Southerner keeps abreast with the Northerner in every channel of progress.

PRODUCT OF IRON AND COAL.

Twelve years ago the total coal product of Alabama was 10,000 tons a year; now, nearly half that amount is sent to market each day, the total tonnage of 1884 being 1,500,000. Twelve years ago the total pig iron product of the State was 60,000 tons; now it is 600,000. These two sentences speak volumes to the iron and coal interests of the whole country. Remember that while the increase noted in the iron and coal product covers a period of twelve years, to date the sluggish product of ante-bellum times, the chief growth has been in one-third of that period, and during a season of continued and steadily increasing depression in the iron and coal trade of the country. This marvellous growth has come in Alabama when the Philadelphia and Reading Railroad Company has been bankrupt by the prostration of the iron and coal industries of Pennsylvania; there has been uninterrupted prosperity here while a large portion of our Pennsylvania furnaces have been driven to idleness and those that continued have, as a rule, been fortunate if they escaped actual loss. In like manner, the coal trade of this region has been reasonably prosperous, while many of our Pennsylvania operators have been bankrupted, and others have escaped bankruptcy by closing their mines. The condition of the coal trade in the North has been clearly portrayed by the almost constant strikes and disputes between employers and employed, each struggling for the little profit the business offered, while here there has been no interruption in the production of coal. Convict labor largely fills the channels of unskilled industry in the mines, but free labor is much better and it more than holds its own even against the unequal competition. There must be great natural causes for this contrast between the iron and coal industries of this city and like industries in Pennsylvania, where a full quarter of a century has been devoted to the perfection of transportation lines and the cheapest methods of production. We

certainly have solved that problem in our State. Capital has not been wanting; on the contrary, it has been lavishly supplied to make our coal and iron beds most profitable; but with all the boundless resources of the North, this iron and coal centre prospers while the same industries in the North languish, and when the South is only in the infancy of transportation facilities. And let not the North be deluded with the idea that this strange development in the South is ephemeral. There has been no sudden local demand and no specially fortuitous circumstances to create a city here as if by magic. It has been done simply because it can, with perfect facilities for reaching the markets of the country, more than rival our chief iron and coal centres of the North; and with that fact accepted, what must be the future of a State that has the resources to multiply its Birmingham almost indefinitely?

THE COAL AND IRON BEDS.

Unless all evidence and calculation are at fault, the iron and coal of this region within range of cheap production, are practically inexhaustible. Birmingham is part of the great Black Warrior coal field that contains over 5,000 square miles of accessible coal, and it may be added the 200 square miles of equally good and accessible coal in the Cahaba field and 150 square miles more in the Coosa field. In addition to these, it may be well to consider the 5,000 square miles of coal just south of the Tennessee. These nearly 11,000 square miles of coal are practically one vast coal field, capable of supplying the world with that commodity. As yet it is not penetrated by water navigation, but when half a million dollars or little more would open the great Warrior coal field to uninterrupted water highways to every port of the world through Mobile bay, how long would it require the lesson of Birmingham to open the grand water highways of Alabama to the illimitable wealth of her coal fields? The maximum cost of coal here is \$1.25 per ton at the furnace doors. It is found in nearly horizontal strata, and varies from 6 to 150 feet in thickness, the Warrior field, whence this city is supplied, having the thickest veins. The iron ore that is mined and delivered cheaper than at any of our great iron fields of the North, is absolutely exhaustless and embraces the red hematite and the brown ores, with a more than ample supply

of limestone close at hand. Red Mountain takes its name from its iron, and is almost literally a mountain of iron. It is estimated by official geological reports that there are 500,000,000,000 tons of iron in it alone. These exceptional facilities for producing iron and coal are increased by the more genial climate and cheaper labor that must ever be obtained where both fuel and food are cheapened by the absence of severe northern winters. This is the only iron centre as yet developed that seems to offer the production of coal at the minimum of cost, as it has every requisite for iron in superabundance, and all attainable at the furnace with the least outlay. The one drawback that has hindered the appearance of Birmingham iron in all our Northern markets is transportation, but even with the disadvantage of costly freights iron from this city now successfully competes with Pennsylvania at home and in New York and New England. The Southern railways cannot afford the cheap freight rates that the Northern lines can offer because of their immensely larger traffic; but the south will rapidly improve in its transportation lines; its improved transportation will rapidly develop industrial products, and both will rapidly cheapen transportation until it approximates Northern rates. And when comparatively cheap railroad transportation shall come to the iron and coal of Alabama, with water transit by the Warrior and Tombigbee rivers to the sea, who can measure the growth of those industries in this State?

THE IRON AND COAL REVOLUTION.

It is idle for Pennsylvania and other great iron and coal producing States to close their eyes to the fact that we have reached the beginning of a great revolution in those products. No legislation, no sound public policy, no sentiment can halt such a revolution when the immutable laws of trade command it; and the sudden tread of the hordes from the northern forests upon ancient Rome did not more surely threaten the majesty of the mistress of the world than does the tread of the iron and coal diggers of Alabama threaten the majesty of Northern iron and coal fields. I do not credit the common saying that iron can be produced here for \$9 per ton. There are many here who will tell you so; but after careful inquiry in the most intelligent and reliable circles, I fix an

entirely safe limit of average cost at \$11.50. There is iron produced here at less than that cost; but \$11.50 is as just an estimate for Birmingham as \$17 is for Pennsylvania; and it must be remembered that Pennsylvania has reached the minimum cost in the production and marketing of her iron, while Alabama can and will greatly cheapen the delivery of her iron in the great centres of trade. And what is true of iron must be equally true of coal. They are twin sisters, whose development must keep pace with each other. Nova Scotia will soon learn to fear Alabama more than the small tariff now imposed upon her imported coal, and instead of extorting double prices for bituminous coal, as she did in the early days of the late war, before protection had developed our northern mines, she will find Alabama crowding both herself and Pennsylvania in the New England factories, and with the water ways of the State perfected, even England will have to look to her laurels in the Central and South American States. These lessons come upon us plain as the noonday sun, and it is midsummer madness not to read them understandingly. We cannot war with destiny; we cannot efface the beneficial gifts of Him who leads the waters to the sea and sends them back in the dews and rains of heaven. Alabama has been gifted far beyond even our boasted empire of Pennsylvania, and only the Southern sluggard has hitherto given the race to the North. Now there is a new South, with new teachings, new opportunities, new energies, and manifestly a new destiny, and the time is at hand when a large portion of the great iron and coal products of the country which enter competing centres will be supplied cheaper from Alabama than from any State in the North. How Pennsylvania will solve the problem, I do not assume to decide; but the logical result would be the transfer of the portion of the iron industry that can best prosper here, from the North to the South, just as the spinning and weaving of the home consumption of cotton must soon come to the cotton fields and the better water power and climate which they furnish.

FUTURE OF BIRMINGHAM.

Three trunk railway lines cross each other in this city; giving it the best railway facilities of any interior Southern centre, except-

ing only Atlanta. These lines, extending by main routes to the Gulf, to the coast, to the east, to the lakes, and to the west, and reaching every part of the country by their connections and tributaries, furnish rare facilities for the development of the wealth that abounds here; and new and important railway lines are soon to be added to them. And when it is considered that as railway outlets multiply, the great river highway of the Warrior river will be hastened to completion, the business possibilities of this region would seem incredible to the North even when cautiously stated. Through the kindness of the Mayor and the President of the Board of Trade, I was enabled to visit and thoroughly examine the great coal mines and the iron establishments which have created Birmingham, and the universal activity and unerring signs of prosperous operations present a marked contrast with our coal and iron centres in the North. There is a furnace here on a farm that furnishes everything necessary to make iron—the iron ore, coal, limestone and sand; but the great beds of iron, coal and limestone, are in a radius of four or five miles. That these exhaustless sources of wealth in such close proximity must soon defy competition in the product of the ordinary iron, I regard as no longer a doubtful problem; but it is yet doubtful whether the competition can extend to the better qualities of iron and to steel. The manufacture of steel has not been attempted as yet, and while it is claimed that it will soon be produced here at the same relative cost as iron and equal in quality to the steel of Pennsylvania, I feel no assurance that it can be done at all. The faith of the iron men of Birmingham is so strong in its resources that they confidently claim everything for it possessed by any other iron district of the world, even to the blades of Damascus; but here, as elsewhere in all the world, there will be material limitations upon the perfection of iron products.

AN INVITING IRON FIELD.

Just what this vast field of as yet untested wealth may produce will be known only when the rattling, rollicking iron infant hurries on toward manhood; but discounting Birmingham by all that is yet undiscovered as to variety of iron, it is the most inviting iron field on the continent, with a coal trade in the near future that will be bounded only by the coal ports of the world; and another

decade will likely see more than an hundred thousand population here, with the whole region dotted with hives of industry such as Birmingham is to-day. With the marvellous progress made here when stagnation prevailed in all the coal and iron centres of the North, what must be the strides of this industrial centre when prosperity comes to revive the same industries in Pennsylvania? This country will draw the young men of energy from the coal and iron mountains of Pennsylvania, just as the fertile prairies of the West have drawn the young men of energy from our Pennsylvania farms, and there is room for thousands of them with better prospects of success than in any new State or Territory of the Union. These are strong expressions, but I write them only after the most exhaustive enquiry and careful examination, and I know that they are fully warranted. This is the coal and iron empire of the South, and, I believe, the future coal and iron empire of the United States; and it has a climate and soil adapted to the bountiful growth of everything grown in Pennsylvania, with one-sixth of the entire cotton crop of the South added. It is the equal of Pennsylvania in forest, field and mine, with climate, natural highways and cheapness of product turning the scales in profit by them. They will not make Pennsylvania poor, for her people and resources are equal to any and all the mutations of industry and trade; but they will make Alabama rich, and that will multiply the wealth and grandeur of the whole Union.

A. K. M.

The Legislature of Alabama unanimously adopted the following joint memorial to Congress, relative to the improvement of the Warrior:

JOINT MEMORIAL

Of the General Assembly of Alabama to the Congress of the United States, asking the appropriation of sufficient money to complete the improvement of the Warrior River, &c.

*To the Honorable the Senate and House of Representatives
of the United States in Congress assembled.*

Your memorialists, the General Assembly of Alabama, respectfully and earnestly recommend and ask the appropriation of a sum sufficient to complete the improvement of the Black Warrior

river in Alabama, in accordance with the estimates and plans heretofore furnished by the Chief of Engineers of the Army of the United States.

Your memorialists respectfully urge in support of this appropriation, its eminent national character, the necessity for the cheapening of coal to the people of the Gulf States, the extension of American commerce in the West Indies, Central and South America and Mexico, which countries, public statistics show, are now mainly supplied with bituminous coal by foreign countries to the practical exclusion of the products of American mines.

Your memorialists respectfully show that the Black Warrior river is navigable to Tuscaloosa, in Alabama, a distance from tide-water of 378 miles, and the improvement of the river above that point is necessary to allow access by water to the great Warrior Coal Fields, consisting of 5500 square miles of coal area, and to the renowned basin of that formation, through the heart of which the upper Warrior flows.

The subject of supplying our naval vessels and commercial marine on the Gulf of Mexico with a certain supply of cheap steam coal, apart from the enormous local benefits arising from cheapening the article to millions of our citizens, is deserving of the earnest consideration of Congress. The history of the country shows the undeniable fact that enormous prices have been paid by the Government, and the people in Gulf ports, for coal for commercial and domestic purposes, supplied from great distances, and by foreign nations, whilst at our own doors lies, almost entirely undeveloped, a coal field of unrivalled quality and in extent sufficient to supply the wants of the entire world, which is at present closed by law to private improvement and neglected by the Government.

Your memorialists respectfully refer to the Act of May 23, 1828, which declares the Warrior river toll free to all citizens of the United States and to all property of the United States, and places the same under the exclusive jurisdiction of Congress. Said act being now codified and known as Section 5244, Revised Statutes of the United States.

Your memorialists further state that large sums have been saved annually to the Government of the United States since the opening of mines in Alabama and the delivery of coal by railroad at tide-water, and it is believed that the additional saving that

may be made by furnishing water transportation will, in a few years, be equal to the sum necessary to improve the upper Warrior.

Your memorialists further show that the streams flowing through the coal measures of other sections of the country have been especially favored by the Government and the product of those mines enabled to reach a market of immense extent, whilst the enormous coal deposit of the Warrior, situated in the heart of the Gulf States, has been rendered practically useless as a means of coal supply by water at cheap rates, owing to the neglect of the Government and the impeding laws before referred to.

In these days, when to enlarge the foreign commerce of our country is an imperative duty, when American influences are gradually being spread in the countries south of us—with the projected canals and railroads on the Isthmus of Panama and Nicaragua—your memorialists respectfully urge, that there is no subject that bears more directly upon the success of our policy and commerce, in those countries, than a supply of cheap steam coal, furnished at tide-water in the Gulf of Mexico.

South America, Central America, the West Indies and Mexico, are mainly supplied with coal from Great Britain, a distance of over 5000 miles, whilst the port of Mobile is, in many instances, only one-fourth the distance, enabling the American ship to make three voyages whilst the foreign vessel can make but one.

Your memorialists respectfully show that coal is now delivered at the mines in Alabama at half the price it costs free on board ship in Great Britain, and thus having the advantage in distance and price, it only remains to furnish water transportation to the tide to enable the Warrior Coal Field to effectively control this immense market now closed to the American coal trade.

Your memorialists respectfully seek to impress upon you the fact that in time of war a supply of cheap steam coal in the Gulf would be a prime necessity, its absence fraught with danger to the country. The amount of money necessary to accomplish this great national undertaking is a trifle, compared with the blessings to be conferred on American commerce, as well as on the Government; and as the estimates show that all this may be accomplished at the cost of one million two hundred thousand dollars, Congress is earnestly besought to grant that sum that the work may be quickly accomplished.

In conclusion, the following letter of Mr. Charles H. Ball, Chief Engineer United States Revenue Marine, as a very valuable testimonial to the superior quality of the coal of the Warrior Field, is given. This testimony of an officer of the United States, of high rank and acknowledged ability in his profession, after several years of practical observation, during which time this coal was put to a severe test, should settle forever its value as a steam-producing fuel :

UNITED STATES REVENUE MARINE,
U. S. Rev. Str. "Seward,"
PORT OF MOBILE, Ala., January 17, 1885.

To whom it may concern :

This is to certify that the Alabama coals used on board this vessel have proved entirely satisfactory, steaming as many, if not more, miles than the coals from the mines of Pennsylvania or Maryland.

I have used at different times the Welsh, Duffryn, Newcastle, Scotch, Van Couvers Island, and other English coals. I consider the Alabama coals superior, as we steam more miles per ton, clean fires less often, and have less smoke.

I consider the Alabama coals a first-class steam coal.

CHAS. H. BALL,
Chief Engineer, U. S. R. Marine.

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